DATA SHEET

CEL

NPN SILICON RF TRANSISTOR

NE67818 / 2SC5752

JEITA Part No.

NPN SILICON RF TRANSISTOR FOR MEDIUM OUTPUT POWER AMPLIFICATION (60 mW) 4-PIN SUPER MINIMOLD

FEATURES

- Ideal for medium output power amplification
- $P_{O\ (1\ dB)}$ = 18.0 dBm TYP. @ V_{CE} = 2.8 V, f = 1.8 GHz, P_{in} = 7 dBm
- HFT3 technology (f_T = 12 GHz) adopted
- High reliability through use of gold electrodes
- 4-pin super minimold package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NE67818-A 2SC5752-A	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 3 (Base), Pin 4 (Emitter) face the perforation side of the tape
NE67818-T1-A 2SC5752-T1-A	3 kpcs/reel	

Remark To order evaluation samples, please contact your nearby sales offices.
Unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	9.0	V
Collector to Emitter Voltage	V_{CEO}	6.0	V
Emitter to Base Voltage	V_{EBO}	2.0	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot} Note	200	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

Note Mounted on 1.08 $cm^2 \times$ 1.0 mm (t) glass epoxy PCB

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

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Document No. P15658EJ1V0DS00 (1st edition)
Date Published August 2001 NS CP(K)

THERMAL RESISTANCE

Parameter	Symbol	Value	Unit
Junction to Ambient Resistance	$R_{th\ j\text{-}a}$ Note	610	°C/W

Note Mounted on 1.08 cm^2 × 1.0 mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0 mA	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 3 V, I_C = 30 mA	75	120	150	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz	–	12.0	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz	8.0	10.0	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 7 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.7	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 3 V, I_E = 0 mA, f = 1 MHz	–	0.46	0.7	pF
Maximum Available Power Gain	MAG Note 3	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz	–	13.0	–	dB
Linear Gain	G_L	V_{CE} = 2.8 V, I_{Cq} = 10 mA, f = 1.8 GHz, P_{in} = –5 dBm	–	12.5	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 2.8 V, I_{Cq} = 10 mA, f = 1.8 GHz, P_{in} = 7 dBm	–	18.0	–	dBm
Collector Efficiency	η_C	V_{CE} = 2.8 V, I_{Cq} = 10 mA, f = 1.8 GHz, P_{in} = 7 dBm	–	55	–	%

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

2. Collector to base capacitance when the emitter grounded

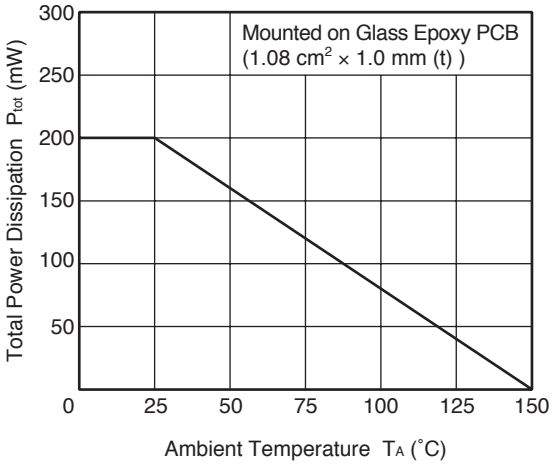
3. $MAG = \left| \frac{S_{21}}{S_{12}} \right| (K - \sqrt{(K^2 - 1)})$

h_{FE} CLASSIFICATION

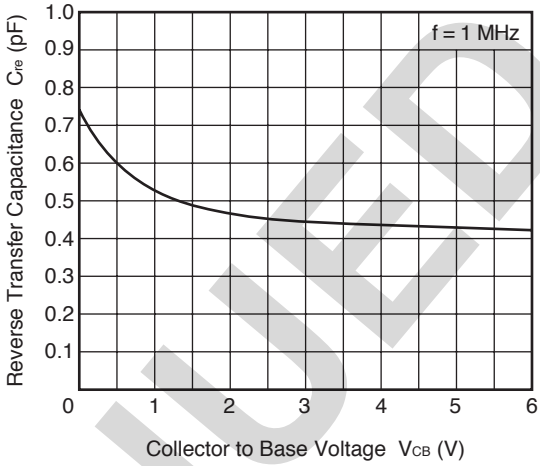
Rank	FB
Marking	R55
h_{FE} Value	75 to 150

TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

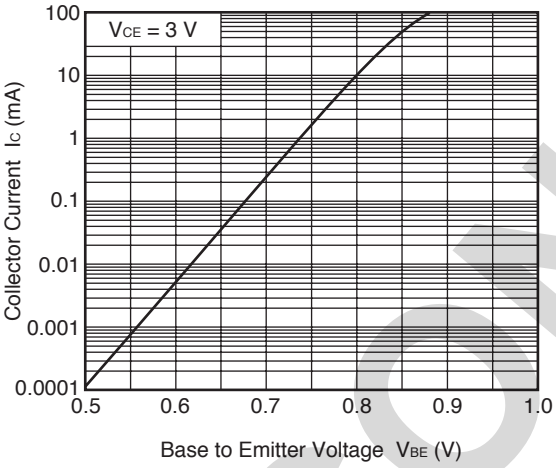
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



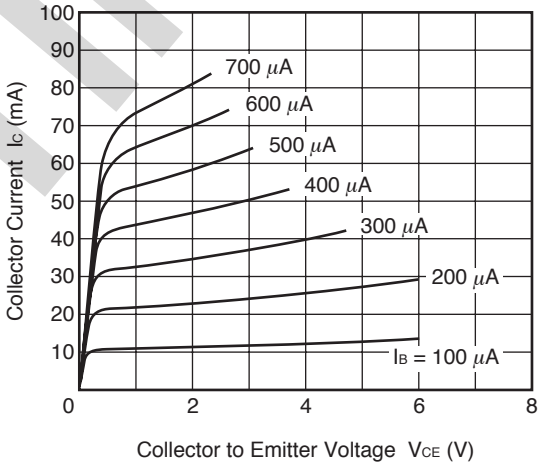
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



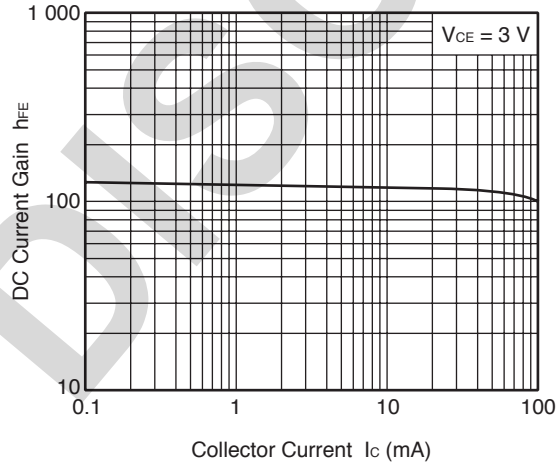
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



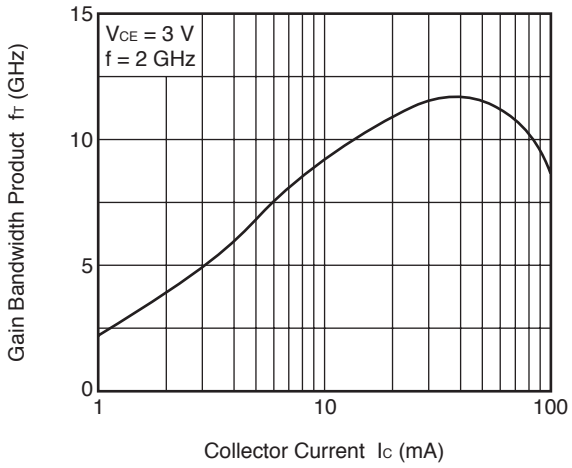
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



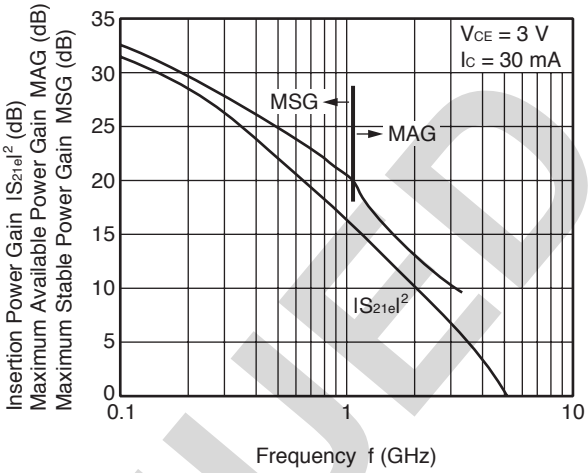
DC CURRENT GAIN vs. COLLECTOR CURRENT



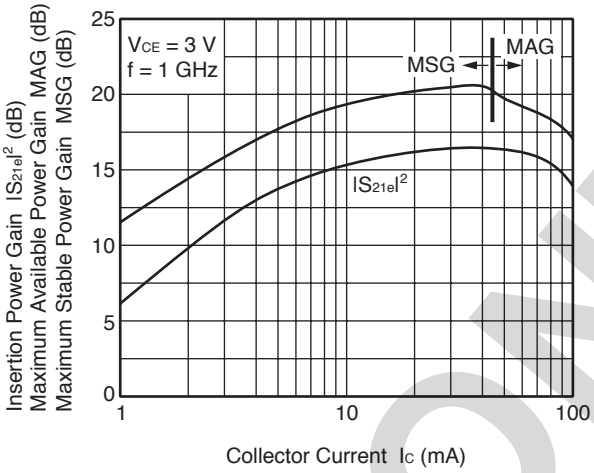
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



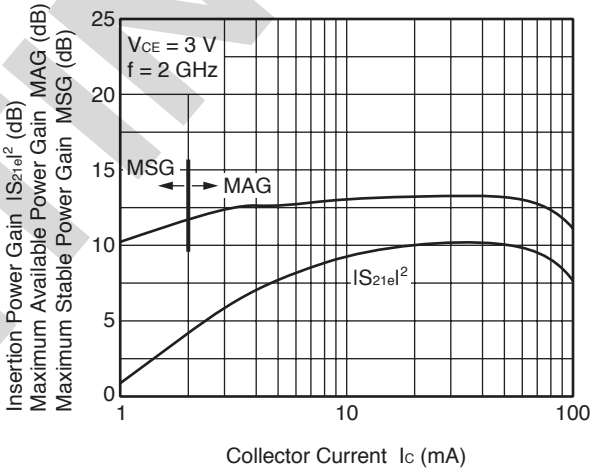
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



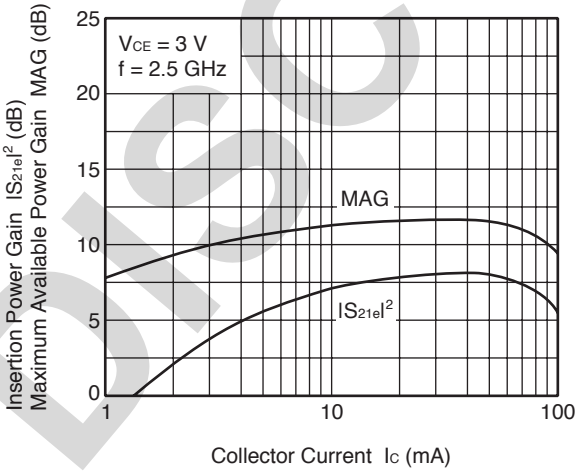
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



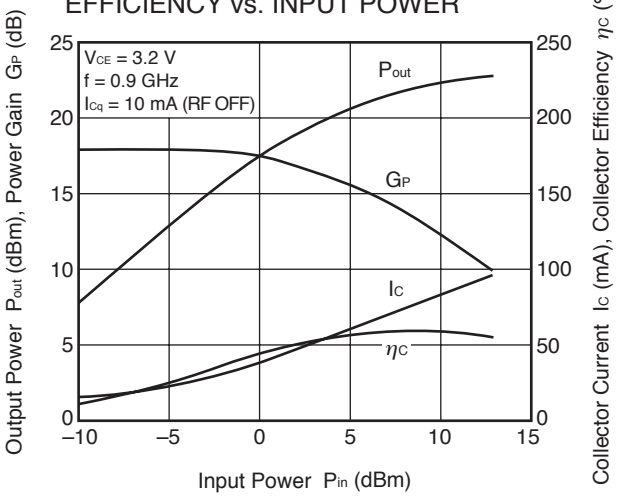
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



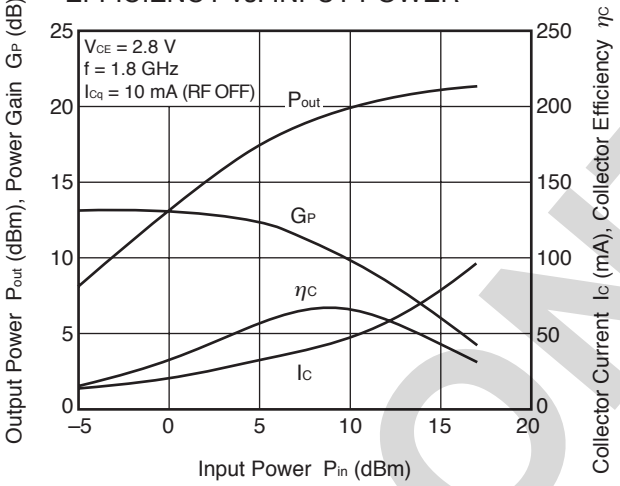
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



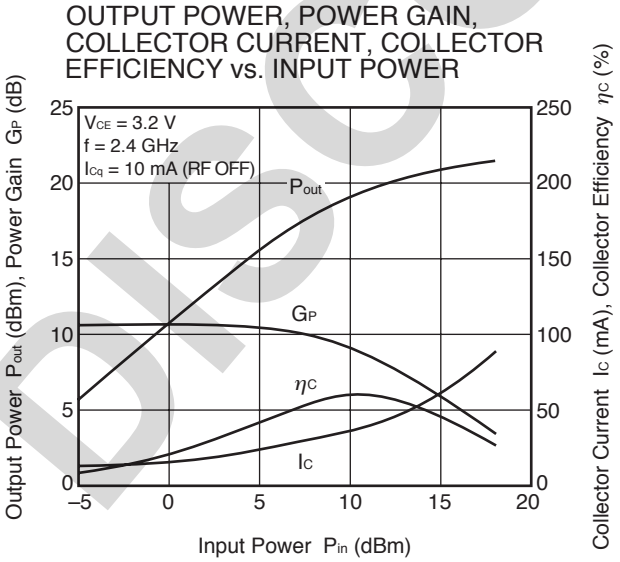
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



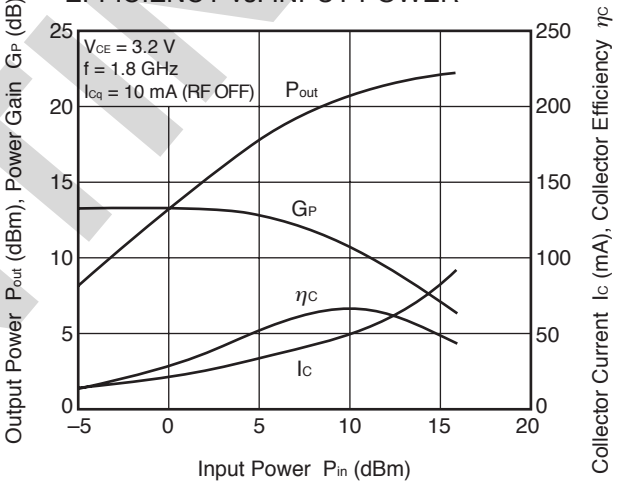
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



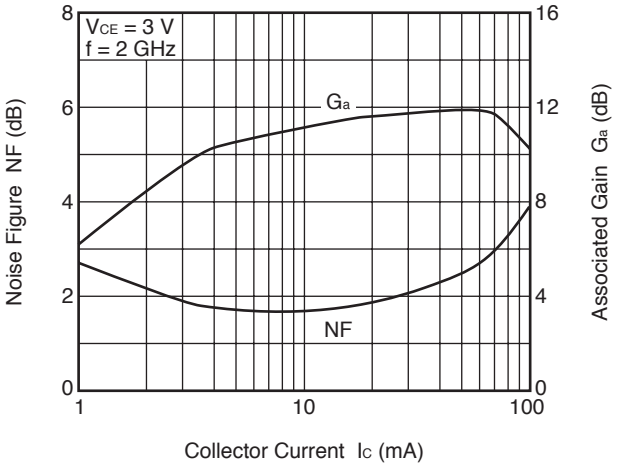
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

Note When K ≥ 1, the MAG (Maximum Available Power Gain) is used. $MAG = \left|\frac{S_{21}}{S_{12}}\right| (K - \sqrt{(K^2 - 1)})$

When K < 1, the MSG (Maximum Stable Power Gain) is used. $MSG = \left|\frac{S_{21}}{S_{12}}\right|$

V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG Note
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.960	−15.2	3.584	169.3	0.028	77.0	1.002	−6.8	0.078	21.12
0.2	0.955	−31.4	3.429	156.8	0.055	69.5	0.977	−14.1	0.075	17.96
0.3	0.930	−47.6	3.310	145.2	0.078	60.0	0.957	−20.6	0.099	16.27
0.4	0.903	−61.7	3.111	134.8	0.098	51.3	0.918	−27.0	0.129	15.01
0.5	0.873	−74.6	2.921	125.3	0.114	42.9	0.888	−32.6	0.168	14.10
0.6	0.845	−87.0	2.704	116.6	0.124	35.3	0.844	−37.8	0.206	13.37
0.7	0.818	−98.4	2.525	108.4	0.133	29.1	0.814	−42.4	0.237	12.77
0.8	0.798	−108.5	2.335	101.1	0.137	23.1	0.778	−47.0	0.279	12.30
0.9	0.781	−118.0	2.186	94.1	0.142	17.7	0.756	−51.0	0.315	11.88
1.0	0.769	−126.9	2.034	87.5	0.142	13.1	0.730	−55.0	0.353	11.55
1.1	0.761	−135.1	1.914	81.4	0.143	8.6	0.717	−59.0	0.377	11.25
1.2	0.751	−142.9	1.780	75.8	0.142	4.6	0.699	−63.1	0.419	10.99
1.3	0.750	−150.1	1.686	69.9	0.140	0.7	0.694	−67.1	0.438	10.80
1.4	0.744	−156.7	1.583	64.7	0.137	−2.7	0.682	−71.1	0.487	10.64
1.5	0.744	−162.9	1.495	59.5	0.133	−6.1	0.679	−75.3	0.517	10.50
1.6	0.742	−168.6	1.405	54.4	0.128	−8.9	0.667	−79.6	0.582	10.39
1.7	0.744	−174.0	1.332	49.6	0.123	−11.6	0.668	−83.8	0.619	10.34
1.8	0.747	−178.9	1.255	45.0	0.117	−13.7	0.658	−88.3	0.691	10.30
1.9	0.750	176.0	1.187	40.4	0.112	−15.5	0.664	−92.8	0.729	10.27
2.0	0.751	171.6	1.119	35.8	0.105	−16.8	0.655	−97.4	0.833	10.27
2.1	0.758	167.3	1.070	31.6	0.099	−17.1	0.668	−102.2	0.842	10.33
2.2	0.762	163.6	1.010	27.5	0.093	−16.8	0.665	−106.6	0.947	10.38
2.3	0.763	159.6	0.964	23.6	0.086	−16.0	0.678	−111.5	1.009	9.93
2.4	0.769	156.1	0.919	19.6	0.080	−14.5	0.676	−115.8	1.126	8.46
2.5	0.774	153.0	0.873	15.9	0.074	−12.1	0.684	−120.7	1.211	7.93
2.6	0.779	149.6	0.825	12.4	0.070	−8.7	0.686	−125.0	1.326	7.27
2.7	0.786	146.2	0.786	9.0	0.067	−4.4	0.690	−129.4	1.384	6.97
2.8	0.792	143.4	0.747	6.2	0.065	−0.3	0.691	−133.3	1.468	6.52
2.9	0.799	141.2	0.718	3.4	0.064	3.7	0.699	−136.7	1.479	6.41
3.0	0.798	138.2	0.685	0.6	0.063	8.9	0.698	−141.1	1.630	5.70

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.911	–23.1	9.644	165.0	0.027	74.7	0.982	–12.0	0.066	25.56
0.2	0.873	–45.3	8.888	149.5	0.050	63.9	0.918	–23.6	0.094	22.50
0.3	0.823	–66.2	8.119	135.8	0.068	52.5	0.853	–33.1	0.145	20.74
0.4	0.782	–83.2	7.237	124.8	0.081	44.2	0.773	–41.4	0.185	19.50
0.5	0.743	–98.1	6.474	115.2	0.089	36.5	0.706	–47.6	0.241	18.60
0.6	0.717	–111.0	5.762	107.4	0.095	30.6	0.642	–53.3	0.288	17.83
0.7	0.694	–122.6	5.184	99.9	0.099	26.1	0.598	–57.8	0.336	17.21
0.8	0.679	–131.9	4.679	93.8	0.100	22.2	0.553	–62.2	0.393	16.71
0.9	0.669	–140.9	4.287	87.9	0.101	18.8	0.524	–66.0	0.436	16.26
1.0	0.662	–148.8	3.926	82.4	0.101	16.3	0.495	–70.0	0.491	15.89
1.1	0.660	–156.0	3.621	77.4	0.101	13.9	0.480	–73.5	0.530	15.54
1.2	0.655	–162.4	3.351	72.9	0.100	12.2	0.460	–77.6	0.591	15.24
1.3	0.660	–168.6	3.125	68.1	0.099	10.5	0.451	–81.1	0.628	14.99
1.4	0.658	–174.0	2.913	63.7	0.098	9.4	0.439	–85.0	0.691	14.74
1.5	0.664	–179.3	2.726	59.6	0.096	8.4	0.435	–88.7	0.731	14.52
1.6	0.663	176.2	2.557	55.4	0.095	7.9	0.425	–92.8	0.802	14.30
1.7	0.670	171.9	2.411	51.5	0.093	7.5	0.426	–96.7	0.848	14.14
1.8	0.675	167.8	2.268	47.7	0.091	7.4	0.418	–101.0	0.914	13.96
1.9	0.678	163.7	2.142	43.9	0.090	7.6	0.424	–105.3	0.963	13.78
2.0	0.684	159.9	2.019	40.0	0.089	8.4	0.420	–109.6	1.030	12.52
2.1	0.693	156.7	1.927	36.4	0.088	9.4	0.430	–114.2	1.040	12.19
2.2	0.698	153.5	1.825	32.8	0.087	11.0	0.432	–118.3	1.099	11.32
2.3	0.703	150.4	1.745	29.3	0.086	12.3	0.444	–122.7	1.122	10.94
2.4	0.707	147.6	1.658	25.9	0.086	14.0	0.447	–126.6	1.182	10.29
2.5	0.714	144.9	1.587	22.5	0.086	15.5	0.459	–130.8	1.192	10.02
2.6	0.720	142.1	1.509	19.4	0.087	17.2	0.463	–134.8	1.217	9.58
2.7	0.728	139.4	1.440	16.3	0.088	18.7	0.472	–138.8	1.221	9.30
2.8	0.736	137.0	1.374	13.3	0.089	19.8	0.476	–142.2	1.228	8.99
2.9	0.744	135.2	1.320	10.5	0.091	20.9	0.488	–145.3	1.211	8.86
3.0	0.743	132.5	1.271	7.6	0.092	22.5	0.491	–149.4	1.259	8.34

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.841	–28.4	14.576	161.5	0.027	72.7	0.961	–16.3	0.099	27.37
0.2	0.802	–55.9	12.909	143.7	0.046	59.8	0.865	–30.9	0.133	24.46
0.3	0.756	–79.4	11.297	129.3	0.061	48.8	0.768	–42.2	0.182	22.71
0.4	0.707	–97.7	9.722	118.4	0.070	40.8	0.669	–51.3	0.249	21.45
0.5	0.674	–112.9	8.461	109.2	0.075	34.7	0.594	–58.0	0.314	20.51
0.6	0.654	–125.5	7.386	101.9	0.079	30.3	0.528	–63.8	0.375	19.72
0.7	0.638	–136.4	6.563	95.2	0.081	27.2	0.482	–68.3	0.435	19.06
0.8	0.630	–145.0	5.843	89.7	0.082	24.8	0.439	–72.9	0.502	18.52
0.9	0.626	–153.2	5.309	84.4	0.083	22.8	0.412	–76.8	0.554	18.04
1.0	0.621	–160.0	4.822	79.6	0.084	21.6	0.387	–81.2	0.617	17.58
1.1	0.625	–166.4	4.433	75.2	0.085	20.5	0.372	–84.9	0.662	17.20
1.2	0.625	–172.2	4.076	71.1	0.085	20.0	0.356	–89.2	0.723	16.82
1.3	0.628	–177.6	3.795	66.8	0.085	19.2	0.348	–92.7	0.765	16.49
1.4	0.630	177.8	3.529	62.9	0.085	19.0	0.337	–97.0	0.827	16.17
1.5	0.637	173.1	3.294	59.1	0.086	19.0	0.335	–100.6	0.863	15.85
1.6	0.641	169.0	3.087	55.3	0.086	19.1	0.326	–105.0	0.922	15.56
1.7	0.646	165.1	2.907	51.9	0.086	19.4	0.328	–109.0	0.959	15.28
1.8	0.654	161.5	2.734	48.5	0.087	19.9	0.323	–113.4	1.004	14.59
1.9	0.657	158.1	2.582	44.9	0.087	20.1	0.329	–117.7	1.041	13.47
2.0	0.662	154.6	2.433	41.5	0.088	20.7	0.328	–122.2	1.086	12.61
2.1	0.674	151.7	2.318	38.0	0.089	21.7	0.339	–126.5	1.081	12.40
2.2	0.678	148.7	2.195	34.9	0.091	22.5	0.342	–130.5	1.115	11.77
2.3	0.682	146.2	2.099	31.7	0.092	23.3	0.355	–134.4	1.133	11.38
2.4	0.687	143.4	2.000	28.3	0.093	24.1	0.359	–138.2	1.157	10.90
2.5	0.693	141.0	1.917	25.2	0.095	24.9	0.371	–141.8	1.158	10.64
2.6	0.702	138.5	1.823	22.4	0.097	25.3	0.377	–145.4	1.162	10.28
2.7	0.710	135.8	1.745	19.4	0.100	25.9	0.388	–149.1	1.154	10.05
2.8	0.717	133.7	1.665	16.6	0.102	26.2	0.392	–152.3	1.163	9.69
2.9	0.727	132.1	1.603	13.8	0.104	26.2	0.404	–155.2	1.137	9.64
3.0	0.725	129.5	1.552	11.2	0.106	26.6	0.409	–158.6	1.169	9.18

V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.792	–34.1	18.596	158.7	0.025	70.3	0.942	–19.9	0.109	28.74
0.2	0.755	–64.9	15.883	139.7	0.043	57.1	0.819	–36.7	0.152	25.67
0.3	0.701	–89.7	13.422	124.7	0.055	46.7	0.704	–49.0	0.224	23.90
0.4	0.664	–108.1	11.311	114.2	0.062	39.7	0.599	–58.6	0.299	22.60
0.5	0.635	–123.1	9.679	105.4	0.066	34.8	0.522	–65.5	0.375	21.66
0.6	0.621	–135.1	8.345	98.8	0.069	31.3	0.457	–71.7	0.449	20.81
0.7	0.610	–145.1	7.364	92.5	0.071	29.3	0.413	–76.4	0.516	20.13
0.8	0.605	–153.0	6.518	87.4	0.073	27.9	0.375	–81.4	0.589	19.54
0.9	0.604	–160.5	5.899	82.5	0.074	26.9	0.350	–85.6	0.644	18.99
1.0	0.606	–166.7	5.356	78.0	0.075	26.5	0.328	–90.4	0.702	18.51
1.1	0.609	–172.6	4.905	73.8	0.077	26.0	0.315	–94.3	0.750	18.06
1.2	0.608	–178.0	4.506	70.1	0.078	25.9	0.302	–99.0	0.812	17.62
1.3	0.615	177.2	4.172	65.9	0.079	25.7	0.295	–102.6	0.851	17.22
1.4	0.618	172.8	3.866	62.3	0.080	26.0	0.287	–107.3	0.906	16.83
1.5	0.628	168.6	3.618	58.8	0.082	26.1	0.285	–111.0	0.930	16.46
1.6	0.630	164.9	3.391	55.4	0.083	26.4	0.279	–115.7	0.981	16.11
1.7	0.636	161.3	3.190	52.1	0.084	26.7	0.282	–119.6	1.011	15.13
1.8	0.644	158.1	3.000	48.8	0.086	27.0	0.279	–124.3	1.044	14.15
1.9	0.649	154.7	2.829	45.5	0.088	27.0	0.286	–128.5	1.065	13.52
2.0	0.655	151.4	2.670	42.3	0.090	27.5	0.288	–133.0	1.095	12.85
2.1	0.665	148.6	2.542	39.0	0.092	28.0	0.298	–137.0	1.089	12.60
2.2	0.668	145.9	2.410	36.0	0.094	28.4	0.303	–140.9	1.117	12.00
2.3	0.675	143.5	2.303	32.9	0.096	28.8	0.316	–144.4	1.118	11.70
2.4	0.680	141.1	2.192	29.9	0.099	29.1	0.321	–148.0	1.132	11.26
2.5	0.686	138.6	2.098	26.8	0.101	29.3	0.334	–151.2	1.131	10.97
2.6	0.692	136.2	2.005	24.1	0.104	29.3	0.339	–154.5	1.138	10.60
2.7	0.702	133.9	1.916	21.3	0.107	29.4	0.351	–157.9	1.125	10.39
2.8	0.709	131.7	1.833	18.6	0.109	29.2	0.356	–160.8	1.129	10.07
2.9	0.720	130.1	1.767	15.7	0.111	28.9	0.368	–163.4	1.101	10.08
3.0	0.717	127.8	1.709	13.3	0.113	29.0	0.373	–166.7	1.134	9.56

V_{CE} = 3 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.735	–41.9	23.488	155.2	0.024	66.6	0.915	–24.3	0.143	29.84
0.2	0.690	–74.7	19.184	134.7	0.040	54.8	0.762	–43.6	0.204	26.84
0.3	0.652	–101.4	15.645	120.0	0.049	44.9	0.632	–56.7	0.279	25.07
0.4	0.621	–119.5	12.844	109.8	0.054	39.4	0.525	–67.1	0.370	23.76
0.5	0.602	–133.7	10.815	101.8	0.057	35.7	0.451	–74.2	0.456	22.75
0.6	0.594	–144.7	9.251	95.5	0.060	33.9	0.392	–81.0	0.539	21.87
0.7	0.590	–154.0	8.098	89.9	0.062	32.9	0.352	–86.1	0.611	21.13
0.8	0.589	–161.1	7.147	85.2	0.064	32.5	0.318	–91.9	0.684	20.47
0.9	0.589	–167.7	6.443	80.7	0.066	32.1	0.297	–96.5	0.742	19.87
1.0	0.589	–173.4	5.825	76.4	0.069	32.3	0.280	–102.0	0.801	19.28
1.1	0.596	–178.7	5.327	72.6	0.071	32.3	0.269	–106.1	0.845	18.78
1.2	0.597	176.7	4.895	69.1	0.073	32.5	0.261	–111.4	0.896	18.28
1.3	0.607	172.1	4.522	65.2	0.075	32.7	0.256	–115.2	0.922	17.80
1.4	0.613	168.2	4.190	62.0	0.077	32.9	0.250	–120.3	0.962	17.35
1.5	0.618	164.4	3.910	58.6	0.080	33.1	0.250	–124.0	0.990	16.91
1.6	0.621	161.0	3.667	55.3	0.082	33.3	0.247	–129.0	1.024	15.55
1.7	0.632	157.5	3.450	52.2	0.084	33.4	0.251	–132.8	1.036	14.96
1.8	0.637	154.6	3.243	49.2	0.087	33.5	0.251	–137.7	1.066	14.16
1.9	0.643	151.5	3.060	46.0	0.089	33.3	0.260	–141.5	1.078	13.64
2.0	0.647	148.5	2.886	42.9	0.092	33.2	0.263	–145.9	1.099	13.03
2.1	0.658	145.9	2.748	39.9	0.095	33.4	0.275	–149.4	1.091	12.76
2.2	0.663	143.5	2.604	37.0	0.098	33.3	0.281	–153.1	1.103	12.27
2.3	0.669	141.2	2.486	34.0	0.102	33.3	0.294	–156.0	1.099	11.97
2.4	0.675	138.7	2.372	31.1	0.104	33.4	0.299	–159.3	1.114	11.55
2.5	0.681	136.3	2.273	28.2	0.107	33.1	0.312	–162.0	1.108	11.28
2.6	0.688	134.2	2.171	25.6	0.110	32.5	0.317	–165.0	1.108	10.95
2.7	0.696	132.0	2.077	23.0	0.113	32.2	0.329	–167.9	1.099	10.72
2.8	0.703	129.8	1.985	20.4	0.116	31.8	0.334	–170.7	1.105	10.37
2.9	0.715	128.4	1.920	17.6	0.118	31.3	0.346	–172.9	1.077	10.42
3.0	0.713	126.2	1.858	15.3	0.121	31.0	0.352	–176.0	1.100	9.95

V_{CE} = 3 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.622	–57.0	32.892	148.1	0.021	61.7	0.850	–33.4	0.201	31.98
0.2	0.594	–96.7	24.530	126.1	0.033	51.8	0.650	–56.5	0.297	28.72
0.3	0.580	–122.5	18.808	112.2	0.039	44.2	0.512	–71.3	0.408	26.85
0.4	0.573	–138.3	14.944	103.4	0.042	41.7	0.416	–82.8	0.519	25.48
0.5	0.571	–150.5	12.342	96.4	0.046	40.6	0.353	–90.9	0.613	24.30
0.6	0.569	–159.6	10.438	91.0	0.049	40.7	0.308	–99.1	0.705	23.31
0.7	0.570	–166.6	9.070	86.1	0.052	41.2	0.278	–105.2	0.775	22.43
0.8	0.572	–172.8	7.969	82.0	0.055	41.9	0.256	–112.4	0.841	21.62
0.9	0.575	–178.1	7.138	78.0	0.058	42.0	0.242	–117.9	0.887	20.88
1.0	0.581	177.2	6.450	74.3	0.062	42.8	0.234	–124.3	0.926	20.19
1.1	0.589	172.8	5.886	70.8	0.065	42.7	0.229	–128.8	0.954	19.58
1.2	0.591	169.0	5.398	67.7	0.069	43.2	0.227	–134.6	0.987	18.96
1.3	0.599	165.4	4.979	64.2	0.072	43.1	0.226	–138.2	1.007	17.91
1.4	0.604	161.9	4.604	61.2	0.075	42.9	0.226	–143.6	1.030	16.78
1.5	0.613	158.6	4.282	58.3	0.079	42.8	0.229	–146.8	1.040	16.11
1.6	0.617	155.5	4.021	55.2	0.083	42.6	0.231	–151.9	1.058	15.39
1.7	0.626	152.8	3.784	52.3	0.086	42.0	0.237	–155.0	1.060	14.93
1.8	0.634	150.0	3.554	49.6	0.090	41.7	0.241	–159.6	1.072	14.34
1.9	0.642	147.3	3.349	46.7	0.093	41.0	0.252	–162.6	1.074	13.89
2.0	0.646	144.5	3.160	43.8	0.097	40.5	0.259	–166.2	1.086	13.33
2.1	0.654	142.2	3.006	40.9	0.101	39.9	0.270	–168.9	1.080	13.02
2.2	0.661	140.0	2.850	38.4	0.105	39.6	0.278	–171.8	1.084	12.59
2.3	0.665	137.8	2.717	35.6	0.108	38.8	0.290	–173.9	1.085	12.23
2.4	0.672	135.4	2.591	32.9	0.111	38.4	0.296	–176.7	1.089	11.85
2.5	0.680	133.5	2.487	30.2	0.115	37.6	0.308	–178.6	1.078	11.66
2.6	0.683	131.3	2.375	27.7	0.119	36.6	0.313	178.8	1.082	11.26
2.7	0.693	129.2	2.273	25.3	0.122	35.8	0.325	176.5	1.075	11.04
2.8	0.702	127.2	2.179	22.7	0.125	35.1	0.331	174.0	1.070	10.80
2.9	0.714	125.9	2.105	20.1	0.128	34.2	0.342	172.4	1.048	10.84
3.0	0.710	123.7	2.043	17.8	0.130	33.5	0.346	169.7	1.070	10.35

V_{CE} = 3 V, I_C = 30 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.572	−66.6	37.447	144.1	0.021	61.1	0.803	−38.5	0.244	32.57
0.2	0.554	−109.0	26.618	121.8	0.029	50.6	0.592	−63.4	0.361	29.65
0.3	0.563	−133.0	19.867	108.7	0.034	46.0	0.458	−78.8	0.481	27.64
0.4	0.560	−147.2	15.628	100.6	0.038	44.2	0.372	−91.0	0.603	26.15
0.5	0.561	−157.8	12.798	94.1	0.042	43.9	0.316	−99.6	0.700	24.88
0.6	0.565	−166.0	10.796	89.0	0.045	44.8	0.279	−108.6	0.787	23.83
0.7	0.569	−172.3	9.330	84.5	0.049	45.8	0.255	−115.2	0.848	22.84
0.8	0.569	−177.5	8.192	80.7	0.052	46.5	0.239	−122.8	0.909	21.97
0.9	0.576	177.5	7.350	76.8	0.056	47.1	0.229	−128.3	0.940	21.18
1.0	0.580	173.3	6.623	73.3	0.060	47.4	0.225	−134.8	0.975	20.44
1.1	0.588	169.6	6.034	70.0	0.064	47.6	0.222	−139.2	0.997	19.77
1.2	0.590	165.8	5.532	67.0	0.068	47.4	0.224	−144.8	1.021	18.22
1.3	0.600	162.3	5.091	63.7	0.072	47.1	0.224	−148.1	1.032	17.43
1.4	0.605	159.4	4.713	60.7	0.075	46.9	0.227	−153.3	1.050	16.59
1.5	0.614	156.1	4.394	57.9	0.080	46.5	0.231	−156.2	1.054	16.00
1.6	0.620	153.4	4.118	55.0	0.084	46.1	0.234	−160.9	1.065	15.38
1.7	0.628	150.7	3.870	52.3	0.087	45.4	0.242	−163.6	1.068	14.89
1.8	0.634	148.1	3.636	49.6	0.091	44.9	0.247	−167.9	1.077	14.32
1.9	0.641	145.4	3.425	46.7	0.095	43.8	0.258	−170.5	1.079	13.85
2.0	0.646	142.8	3.237	44.0	0.099	43.0	0.266	−173.8	1.087	13.35
2.1	0.658	140.7	3.073	41.3	0.103	42.3	0.277	−176.1	1.074	13.09
2.2	0.663	138.5	2.914	38.7	0.107	41.6	0.285	−178.8	1.079	12.64
2.3	0.669	136.3	2.776	36.0	0.111	40.8	0.297	179.4	1.076	12.31
2.4	0.673	134.1	2.650	33.3	0.114	40.1	0.304	176.8	1.082	11.91
2.5	0.681	132.1	2.540	30.8	0.118	39.2	0.314	175.2	1.074	11.69
2.6	0.685	130.1	2.431	28.4	0.122	38.1	0.320	172.8	1.076	11.33
2.7	0.695	128.0	2.326	25.9	0.125	37.2	0.332	170.8	1.066	11.13
2.8	0.703	126.2	2.226	23.5	0.128	36.4	0.337	168.4	1.066	10.82
2.9	0.710	124.8	2.148	21.0	0.131	35.3	0.349	167.0	1.055	10.72
3.0	0.710	122.6	2.088	18.8	0.134	34.6	0.353	164.3	1.067	10.36

V_{CE} = 3 V, I_C = 40 mA, Z_O = 50 Ω

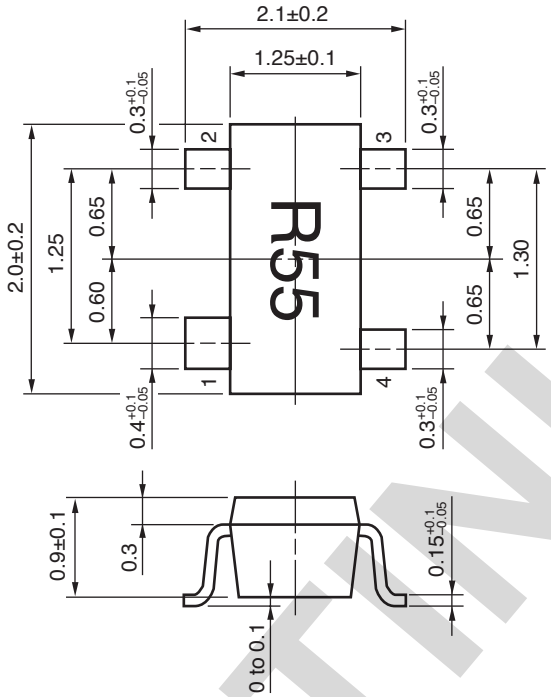
Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.529	−74.7	39.951	141.5	0.020	62.0	0.770	−42.0	0.266	33.10
0.2	0.542	−116.6	27.485	119.4	0.027	49.7	0.554	−67.6	0.404	30.03
0.3	0.552	−138.5	20.169	106.8	0.032	46.4	0.425	−83.4	0.539	28.06
0.4	0.558	−152.2	15.779	98.9	0.036	46.6	0.346	−95.9	0.658	26.44
0.5	0.558	−162.2	12.897	92.8	0.039	46.4	0.296	−104.8	0.757	25.15
0.6	0.564	−169.4	10.836	87.9	0.043	47.0	0.264	−114.1	0.837	24.03
0.7	0.572	−175.4	9.387	83.4	0.047	48.5	0.243	−120.8	0.889	23.02
0.8	0.574	179.6	8.227	79.8	0.051	49.2	0.231	−128.5	0.940	22.09
0.9	0.579	175.3	7.368	76.2	0.055	49.6	0.223	−134.1	0.971	21.28
1.0	0.583	171.2	6.643	72.6	0.059	49.9	0.221	−140.4	1.000	20.51
1.1	0.593	167.6	6.053	69.4	0.063	49.8	0.220	−144.6	1.013	19.12
1.2	0.594	164.2	5.540	66.5	0.068	49.8	0.223	−150.0	1.036	17.98
1.3	0.603	160.9	5.104	63.3	0.072	49.3	0.224	−153.1	1.044	17.25
1.4	0.608	157.8	4.729	60.3	0.076	48.9	0.228	−158.1	1.061	16.45
1.5	0.618	154.8	4.389	57.5	0.080	48.5	0.232	−160.7	1.062	15.88
1.6	0.624	152.0	4.109	54.7	0.084	47.9	0.237	−165.3	1.072	15.25
1.7	0.633	149.3	3.870	52.0	0.088	47.1	0.245	−167.8	1.070	14.82
1.8	0.639	147.0	3.638	49.3	0.092	46.4	0.251	−171.8	1.077	14.27
1.9	0.646	144.4	3.425	46.6	0.096	45.2	0.262	−174.2	1.077	13.82
2.0	0.650	141.9	3.231	43.8	0.100	44.5	0.270	−177.3	1.088	13.29
2.1	0.659	139.9	3.073	41.2	0.104	43.5	0.282	−179.4	1.079	12.98
2.2	0.667	137.6	2.911	38.8	0.108	42.8	0.290	178.0	1.077	12.60
2.3	0.670	135.6	2.780	36.0	0.112	41.8	0.302	176.3	1.078	12.24
2.4	0.677	133.5	2.648	33.3	0.116	41.0	0.309	173.8	1.080	11.87
2.5	0.685	131.6	2.541	30.8	0.119	40.1	0.319	172.4	1.070	11.68
2.6	0.691	129.3	2.430	28.5	0.123	38.9	0.324	169.9	1.070	11.34
2.7	0.698	127.4	2.324	26.0	0.127	37.9	0.336	168.0	1.066	11.07
2.8	0.708	125.4	2.226	23.6	0.130	37.1	0.342	165.8	1.060	10.85
2.9	0.715	124.3	2.151	21.1	0.133	36.0	0.353	164.4	1.050	10.73
3.0	0.712	122.1	2.090	19.0	0.135	35.1	0.357	161.9	1.065	10.33

V_{CE} = 3 V, I_C = 80 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.474	–97.6	40.464	134.7	0.018	53.1	0.663	–49.9	0.377	33.51
0.2	0.542	–135.3	25.785	113.4	0.025	47.1	0.450	–76.5	0.523	30.20
0.3	0.572	–153.1	18.367	102.0	0.029	47.3	0.342	–92.3	0.667	28.06
0.4	0.587	–163.0	14.218	95.1	0.032	48.6	0.282	–105.1	0.785	26.44
0.5	0.589	–170.9	11.524	89.5	0.036	49.9	0.245	–114.0	0.884	25.05
0.6	0.596	–177.0	9.658	85.1	0.040	51.0	0.224	–123.3	0.953	23.82
0.7	0.604	178.0	8.334	80.9	0.045	52.5	0.211	–129.8	0.991	22.71
0.8	0.607	174.1	7.302	77.3	0.049	53.0	0.206	–137.4	1.037	20.59
0.9	0.612	170.0	6.532	73.8	0.053	53.3	0.202	–142.2	1.057	19.44
1.0	0.618	166.6	5.888	70.4	0.058	53.6	0.205	–148.2	1.076	18.41
1.1	0.623	163.2	5.357	67.3	0.062	53.2	0.206	–151.7	1.090	17.54
1.2	0.627	160.2	4.906	64.4	0.067	53.0	0.213	–156.6	1.103	16.71
1.3	0.637	157.3	4.513	61.3	0.071	52.4	0.216	–159.1	1.102	16.08
1.4	0.639	154.3	4.190	58.4	0.076	51.9	0.222	–163.5	1.117	15.36
1.5	0.651	151.8	3.884	55.6	0.080	51.3	0.227	–165.7	1.111	14.83
1.6	0.655	149.1	3.641	52.8	0.084	50.5	0.234	–169.9	1.119	14.25
1.7	0.661	146.7	3.421	50.1	0.088	49.5	0.243	–172.1	1.119	13.78
1.8	0.669	144.2	3.215	47.4	0.093	48.7	0.251	–175.7	1.120	13.30
1.9	0.673	141.8	3.022	44.8	0.097	47.4	0.262	–177.7	1.125	12.78
2.0	0.680	139.4	2.858	42.0	0.101	46.5	0.272	179.5	1.124	12.37
2.1	0.686	137.5	2.710	39.3	0.105	45.6	0.284	177.6	1.118	12.01
2.2	0.691	135.4	2.569	36.9	0.110	44.5	0.293	175.2	1.119	11.59
2.3	0.698	133.4	2.447	34.1	0.114	43.6	0.305	173.8	1.115	11.27
2.4	0.703	131.4	2.335	31.4	0.117	42.6	0.313	171.5	1.114	10.93
2.5	0.709	129.4	2.238	29.0	0.121	41.6	0.323	170.2	1.108	10.67
2.6	0.715	127.3	2.138	26.7	0.125	40.4	0.330	167.8	1.105	10.35
2.7	0.724	125.6	2.047	24.2	0.129	39.2	0.341	166.1	1.093	10.15
2.8	0.732	123.5	1.962	21.8	0.132	38.4	0.348	163.7	1.091	9.88
2.9	0.738	122.5	1.893	19.5	0.135	37.3	0.359	162.7	1.080	9.75
3.0	0.737	120.5	1.841	17.1	0.138	36.3	0.364	160.2	1.091	9.42
4.0	0.795	104.4	1.310	–4.7	0.168	23.3	0.480	142.1	1.010	8.31

PACKAGE DIMENSIONS

4-PIN SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Collector
2. Emitter
3. Base
4. Emitter

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